

CLAIMS

What is claimed is:

1. A multiple layered non-PVC containing tubing structure comprising:
a first layer of a polymer blend of (a) from about 30% to about 50% by weight of the first layer a first polyolefin selected from the group consisting of polypropylene and polypropylene copolymers, (b) from about 0% to about 50% by weight of the first layer a second polyolefin of an α -olefin containing polymer; (c) from about 0% to about 40% by weight of the first layer of a radio frequency susceptible polymer selected from the group consisting of polyamides, ethylene acrylic acid copolymers, ethylene methacrylic acid copolymers, polyimides, polyurethanes, polyesters, polyureas, ethylene vinyl acetate copolymers with a vinyl acetate comonomer content from 18-50% by weight of the copolymer, ethylene methyl acrylate copolymers with methyl acrylate comonomer content from 18%-40% by weight of the copolymer, ethylene vinyl alcohol with vinyl alcohol comonomer content from 15%-70% by mole percent of the copolymer; (d) from about 0% to about 40% of a first thermoplastic elastomer; and
a second layer of a non-PVC containing material of a multiple component polymer blend.
2. The tubing of claim 1 wherein the second layer is coaxially mounted within the first layer.
3. The tubing of claim 1 wherein the first layer is coaxially mounted within the second layer.
4. The tubing of claim 1 wherein the polymer blend comprises by weight of the second layer: from about 25% to about 55% by weight of a second thermoplastic elastomer, from about 20% to about 45% of a polyester polyether block copolymer, from about 0% to about 15% ethylene copolymerized with vinyl lower alkyl esters, from about 0% to about 10% of a propylene containing polymer and from about 0% to about 35% of a polymer selected from the group consisting of acrylonitrile butadiene styrene block copolymer, styrene ethylene butene copolymer, styrene acrylonitrile copolymer, cyclic olefin containing polymers and bridged polycyclic olefin containing polymers.

5. The tubing of claim 1 wherein the polyamide is selected from a group consisting of aliphatic polyamides resulting from the condensation reaction of di-amines having a carbon number within a range of 2-13, aliphatic polyamides resulting from a condensation reaction of di-acids having a carbon number within a range of 2-13, ring opening reactions of cyclic amides, polyamides resulting from the condensation reaction of dimer fatty acids, and amide containing copolymers.

6. The tubing of claim 1 wherein the polyamide is a dimer fatty acid polyamide.

7. The tubing of claim 1 wherein the first polyolefin is a propylene copolymerized with a monomer selected from the group consisting of α -olefins having from 2-17 carbons.

8. The tubing of claim 7 wherein the first polyolefin is a propylene and ethylene copolymer having an ethylene content of from about 1% to about 8% by weight of the first polyolefin.

9. The tubing of claim 1 wherein the first thermoplastic elastomer is selected from the group consisting of a first styrene and hydrocarbon copolymer.

10. The tubing of claim 9 wherein the first thermoplastic elastomer is maleic anhydride functionalized.

11. The tubing of claim 10 wherein the first thermoplastic elastomer is a styrene-ethylene-butene-styrene block copolymer.

12. The tubing of claim 11 wherein the first thermoplastic elastomer is selected from the group consisting of styrene and hydrocarbon diblock copolymers, styrene and hydrocarbon block copolymers and styrene and hydrocarbon star block copolymers.

13. The tubing of claim 10 wherein the first thermoplastic elastomer is functionalized with a group selected from the group consisting of carboxylic acid, esters of carboxylic acids, anhydrides of carboxylic acids, epoxides, and carbon monoxide.

14. The tubing of claim 13 wherein the first thermoplastic elastomer is maleic anhydride functionalized.

15. The tubing of claim 4 wherein the second styrene and hydrocarbon copolymer is selected from the group consisting of styrene and hydrocarbon diblock copolymers, styrene and hydrocarbon triblock copolymers, styrene and hydrocarbon star block copolymers and blends of the same.

16. The tubing of claim 15 wherein the second thermoplastic elastomer is a styrene-ethylene-butene-styrene block copolymer.

17. The tubing of claim 1 wherein the second polyolefin is an α -olefin copolymerized with a ethylene monomer.

18. The tubing of claim 17 wherein the second polyolefin is an ethylene and α -olefin copolymer.

19. The tubing of claim 18 wherein the ethylene and α -olefin copolymer is obtained using a single site catalyst.

20. A multiple layered non-PVC containing tubing structure comprising:
a first layer of a non-PVC containing multiple component polymer blend; and
a second layer attached to the first layer of a non-PVC containing material of multiple component polymer blend of from about 25% to about 55% by weight of a first thermoplastic elastomer, from about 20% to about 45% of a polyester polyether block copolymer, from about 0% to about 15% ethylene copolymerized with vinyl lower alkyl esters, from about 0% to about 10% of a propylene containing polymer and from about 0% to about 35% of a component selected from the group consisting of acrylonitrile butadiene styrene block copolymer, styrene ethylene butene copolymer, styrene acrylonitrile copolymer, cyclic olefin containing polymers and bridged polycyclic olefin containing polymers.

21. The tubing of claim 20 wherein the second layer is coaxially mounted within the first layer.

22. The tubing of claim 20 wherein the first layer is coaxially mounted within the second layer.

23. The tubing of claim 20 wherein the first layer is a polymer blend comprising by weight of the first layer: (a) from about 30% to about 50% of a first polyolefin selected

from the group consisting of polypropylene and polypropylene copolymers, (b) from about 0% to about 50% of a second polyolefin of an α -olefin containing polymer, (c) from about 0% to about 40% of a radio frequency susceptible polymer selected from the group consisting of polyamides, ethylene acrylic acid copolymers, ethylene methacrylic acid copolymers, polyimides, polyurethanes, polyesters, polyureas, ethylene vinyl acetate copolymers with a vinyl acetate comonomer content from 18-50% by weight of the copolymer, ethylene methyl acrylate copolymers with methyl acrylate comonomer content from 18%-40% by weight of the copolymer, ethylene vinyl alcohol with vinyl alcohol comonomer content from 15 %-70% by mole percent of the copolymer; and (d) from about 0% to about 40% of a second thermoplastic elastomer.

24. The tubing of claim 20 wherein the first thermoplastic elastomer is a first styrene and hydrocarbon copolymer.

25. The tubing of claim 24 wherein the first styrene and hydrocarbon copolymer is selected from the group of styrene and hydrocarbon diblock copolymers, styrene and hydrocarbon triblock copolymers, and styrene and hydrocarbon star block copolymers.

26. The tubing of claim 25 wherein the first thermoplastic elastomer is a styrene-ethylene-butene-styrene block copolymer.

27. The tubing of claim 26 wherein the first thermoplastic elastomer is a first styrene-ethylene-butene-styrene block copolymer.

28. The tubing of claim 20 wherein the vinyl lower alkyl esters is selected from the group consisting of vinyl methanoate, vinyl acetate, vinyl propionate, and vinyl butyrate.

29. The tubing of claim 28 wherein the vinyl lower alkyl ester is vinyl acetate.

30. The tubing of claim 28 wherein the ethylene and vinyl lower alkyl ester is an ethylene and vinyl acetate copolymer having a vinyl acetate content from about 12% to about 32% by weight of the copolymer.

31. The tubing of claim 20 wherein the propylene containing polymer is propylene copolymerized with a monomer selected from the group consisting of α -olefins having from 2-17 carbons.

32. The tubing of claim 31 wherein the propylene containing polymer is a propylene and ethylene copolymer having an ethylene content of from about 1% to about 6% by weight of the copolymer.

33. The tubing of claim 23 wherein the second polyolefin is obtained using a single-site catalyst.